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EXAMINER

TRAN, MY CHAU T

ART UNIT

PAPER NUMBER

1639

DATE MAILED: 06/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/763,607

Applicant(s)

STAHLER ET AL.

Examiner

MY-CHAU T. TRAN

Art Unit

1639

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11, 13-18, 21-23, 27-52, 56 and 57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-18, 21-23, 27-52, 56 and 57 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>See Office Action</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/27/2006 has been entered.

### ***Application and Claims Status***

2. Applicant's amendment and response filed 02/27/2006 is/are acknowledged and entered. Claims 19, 20, and 53-55 have been cancelled. Claims 1, 14, 27, 28, 47, and 56 have been amended. Claim 57 has been added.
3. The amendment filed on 07/21/2005: cancelled claims 12 and 24-26; amended claims 1-11, 13-23, and 27; and added claims 28-56.
4. Claims 1-11, 13-18, 21-23, 27-52, and 56-57 are pending.

### ***Election/Restrictions***

5. The instant species election requirement is still in effect as there is no allowable generic or linking claim. Applicant has elected the following species for the elected invention (Claims 1-23 and 27): Applicants have further elected 'nucleic acids' as chemical or biological materials;

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and 'illumination matrix arrangement involving transmitted light' as species to be examined in the response filed on 6/2/03. Applicants in the response filed on 10/28/04 further have elected 'ultraviolet light' as species of electromagnetic radiation used in the exposure; radiation which can be focused in different planes as the species of radiation; 'a reflection matrix' as the species of illumination matrix; and a 'glass' as the species of carrier.

***Priority***

6. This instant application is a 371 of PCT/EP99/06,316 filed 08/27/1999.
7. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. The papers for German Applications the are as follows: 19,839,255.9 filed 08/28/1998; 19,839,256.7 filed 08/28/1998; 19,907,080.6 filed 02/19/1999; and 19,924,327.1 filed 05/27/1999. However, it noted that no copy is found for German Application 19,839,254.0 filed 08/28/1998 in which is also claimed for benefits of the foreign filing date under 35 U.S.C. 119(a)-(d). It is requested that applicant submitted the certified copy of the application. In addition, it is acknowledge that applicant has provided an English language translation for the German Application 19,907,080.6 filed 02/19/1999 and has been placed of record in the file.

***Information Disclosure Statement***

8. The information disclosure statements (IDS) filed on 02/27/2006 have been reviewed, and its references have been considered as noted on PTO-1449 forms.

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9. Claims 1-11, 13-18, 21-23, 27-52, and 56-57 are under consideration in this Office Action.

***Status of Claim(s) Objection(s) and /or Rejection(s)***

10. The rejections of claim 47 under 35 USC 112, second paragraph, as being indefinite for insufficient antecedent basis has been withdrawn in light of applicant's amendments of claim 47.

11. The rejection of claims 1-11, 13-18, 21-23, 27-52, and 56 under 35 USC 102(e) as being anticipated by US Patent 6,271,957 B1 (Quate et al.) has been withdrawn in light of applicant's amendments wherein the limitations of "detecting said illumination pattern" and/or "UV light source array" have been added to claims 1, 27, and 56.

12. The rejection of claims 1-11, 13-18, 21-23, 27-52, and 56 under 35 USC 102(e) as being anticipated by US Patent 6,375,903 B1 (Cerrina et al.) has been withdrawn in view of applicant's amendments wherein the limitations of "detecting said illumination pattern" and/or "UV light source array" have been added to claims 1, 27, and 56. However, upon further consideration, a new ground of rejection is made in view of Gordon (US Patent 5,892,577).

13. The provisionally rejection under the judicially created doctrine of obviousness-type double patenting of claims 1-23 and 27 over claims 1-38 of copending Application U.S. Patent No. 10/727,566 has been withdrawn in light of applicant's amendments of claim 1 and the preliminary amendment for copending Application U.S. Patent No. 10/727,566 filed 12/05/2003, which cancelled claims 1-38.

***Claim Objections***

14. Claims 1, 11, 27, 36, and 56 are objected to because of the following informalities:

a) Claims 1, 27, and 56 are objected to because the claim contain(s) improperly written Markush language, i.e. the limitation of “*biologically or chemically functional materials or building blocks*” of the instant claimed ‘binding’ step. For example one acceptable form of alternative expression, i.e. Markush group, recites members as being “selected from the group consisting of A, B, C, and D”.

b) Both claims 11 and 36 recite the limitation of ‘*wherein said predetermined area is surrounded by nonactivated or nonactivatable areas*’. The phrase ‘*nonactivated or nonactivatable areas*’ is unclear because the term “*nonactivated*” and “*nonactivatable*” are synonymous with each other, i.e. both mean not active and they are the verb form and noun form, respectively, of the term ‘nonactive’.

Appropriate correction is required.

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. Claims 1-11, 13-18, 21-23, 27-52, 56, and 57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection

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desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, the step limitation of "*binding said biologically or chemically functional materials or building blocks for said materials on said predetermined area of said carrier surface*" of claims 1, 27, and 56 recites the broad recitation of a Markush group of 'type' of compounds being bound to the instant claimed 'carrier surface', i.e. the limitation of "*biologically or chemically functional materials or building blocks*", and the claims also recite the limitation of "*for said materials*" refers to the recite compound of "*biologically or chemically functional materials*", i.e. a "*biologically functional materials*" or a "*chemically functional materials*" is being bound to the instant claimed 'carrier surface', which is the narrower statement of the limitation. Consequently, it is unclear what 'type' of compound is being bound to the instant claimed 'carrier surface', i.e. the 'type' of compound encompasses compounds such as biological, chemical, or building blocks *or* that the compound being bound to the instant claimed 'carrier surface' is either a biological or a chemical compound. As a result,

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claims 1, 27, and 56 and all their dependent claims are rejected under 35 U.S.C. 112, second paragraph.

b. Claims 1, 27, and 56 recite the limitation "a carrier" in line 4. There is insufficient antecedent basis for this limitation in the claims 1, 27, and 57 since the first recitation of the instant claimed carrier is "*a biochip carrier*" of line 1. Consequently, the limitation "a carrier " in line 4 lacks antecedent basis.

c. The phrase "*partially removing materials*" in claims 22 and 44 is a relative term, which renders the claim indefinite. The phrase "*partially removing materials*" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In the present instance, the limitation "*at least partially removing materials bound on the carrier*" is indefinite because it unclear as to what material bound to instant claimed 'carrier' is being '*partially*' removed. Is the "part" of the material being remove refers to the functional group of the biological and/or chemical compound, the functional group of the building block, or an individual building block that are being '*partially*' removed since they are bound to the instant claimed 'carrier' of claim 1? Or Is "*partially removing materials*" refers to the location of the material bound to the instant claimed 'carrier' that is being removed, i.e. certain 'predetermine area' containing of the "*photoactivatable groups*" bound the instant claimed 'carrier' is being remove? As a result, claims 22 and 44 and all their dependent claims are rejected under 35 U.S.C. 112, second paragraph.



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d. Claim 56 recites the limitation "said illumination pattern" in line 16. There is insufficient antecedent basis for this limitation in the claim 56 since this limitation is the first recitation of the claimed limitation of "*illumination pattern*". Consequently, the limitation "said illumination pattern" in line 16 lacks antecedent basis.

e. The phrases "*exposure pattern*" and "*illumination pattern*" of claim 56 are vague and indefinite because it is unclear whether the "*exposure pattern*" and "*illumination pattern*" are synonymous with each other. As claimed, step (b) generates an "*exposure pattern*" and step (c) detects the "*illumination pattern*". As a result it is unclear how the "*illumination pattern*" is being detected when an "*exposure pattern*" is created. As a result, claim 56 and all its dependent claims are rejected under 35 U.S.C. 112, second paragraph.

### ***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claims 1-4, 7-11, 13-17, 21-23, 46-49, 51, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) in view of Derndinger et al. (US Patent 5,239,178).

*The instant claimed invention recites a method for coating a biochip carrier with biologically or chemically functional materials.*

*The method comprises the steps of (a) providing a carrier, and illumination matrix, and a detector; (b) activating said photoactivatable groups on at least a predetermined area of said carrier surface by location- specific illumination of said predetermined area of said carrier surface using said illumination matrix to generate an adjustable illumination pattern; (c) detecting said illumination pattern using said detector and optionally adjusting said illumination pattern; (d) binding said biologically or chemically functional materials or building blocks for said materials on said predetermined areas of said carrier surface; and (e) repeating the activating, detecting, and binding steps on the same or different predetermined areas of said carrier surface.*

*The detector comprises a light sensor matrix.*

*The carrier having a surface comprises photoactivatable groups located on predetermined areas of said carrier surface.*

*In step (c) of the presently claimed method, the limitation is base on the instant claimed term "optionally", the broadest definition of the term "optionally" is applied, i.e. it is a choice. Thus, this method step is broadly interpreted as **either** being included in the method **or** not, i.e. it can be interpreted that the step of optionally adjusting said illumination pattern is omitted from the presently claimed method.*

Pirrung et al. disclose methods and apparatus for the preparation and use of a substrate having a plurality of polymer sequences in predefined regions (see e.g. Abstract; col. 3, lines 6-38; col. 8, lines 17-19).

The substrate (refers to instant claimed carrier) comprises an etched surface (refers to instant claimed predetermined area) and linker molecules on the surface of the substrate wherein the linker molecules are provided with a photoremovable protective group (refers to instant

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claimed photoactivatable groups)(see e.g. col. 3, lines 8-11; col. 8, lines 1-7 and 60-65; col. 11, lines 42-50; col. 12, lines 43-57). The substrate materials include materials such as glass, silicon, and polymers (refers to instant claims 8, 9, 47, and 48)(see e.g. col. 11, lines 29-41). The apparatus for the preparation of the substrate (refers to instant claimed illumination matrix) comprises a light source and a mask (see e.g. col. 3, lines 34-38; col. 13, lines 36-67; col. 14, lines 5-59).

The method comprises the steps of removing the photoremovable protective group on the linker molecules that are attached to the surface of the substrate by exposing the photoremovable protective group to light using a mask to direct light from the light source to selected regions on the substrate (refers to instant claimed steps (a) and (b), and instant claim 17), attaching the monomer to the surface of the substrate by reacting the monomer with the exposed functional group on the surface of the substrate (refers to instant claimed step (d)), and the steps (i.e. the removing and attaching steps) are repeated to selectively apply monomers until polymers of a desired length and chemical sequence are obtained (refers to instant claimed step (e) and instant claims 15, 22, and 23)(see e.g. col. 3, lines 8-38; col. 8, lines 17-33 and 46-65; col. 9, line 14 thru col. 10, line 30; col. 14, line 60 thru col. 15, line 48; figs. 1-7). The removing step generates a pattern of light and dark areas by selectively irradiating at least a first area of a surface of the substrate (refers to instant claims 4 and 11)(see e.g. figs. 15 A; claims 1). The area ranges from  $1\text{ }\mu\text{m}^2$  to  $10,000\text{ }\mu\text{m}^2$  (refers to instant claims 10 and 49)(see e.g. col. 15, lines 56-63; claim 6). The method produces an array of different polymers (refers to instant claim 16)(see e.g. col. 15, line 64 thru col. 16, line 8) and the polymers include nucleic acids, polysaccharides, or peptides (refers to instant claimed biological or chemically functional materials, and claims 13, 14, 51,

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and 52). The radiation used includes ultraviolet (UV), infrared (IR), or visible light (refers to instant claims 2 and 3)(col. 8, lines 66-67; col. 13, line 29 thru col. 14, line 59).

The method and apparatus of Pirrung et al. differs from the presently claimed invention by failing to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the detector.

Derndinger et al. disclose a device for three-dimensional examination of object (see e.g. Abstract; col. 1, line 53 thru col. 2, line 2). The device comprises an illumination grid, a detector grid, and optical elements to image the illumination grid in a focal plane and to image the focal plane on the detector grid (see e.g. col. 1, line 56-62; col. 2, lines 3-23; col. 5, line 41 thru col. 6, line 59; claims 1 and 22). The detector grid includes a plurality of independent detector elements and is a CCD (Charge Coupled Device) receiver (refers to instant claimed light sensor matrix and instant claim 46)(see e.g. col. 3, lines 20-49; col. 5, line 41-53; col. 6, line 9-19; claims 3, 17, and 23). The illumination grid is produced by a light source array such as individual LEDs (light emitting diode) or liquid crystal display (refers to instant claim 7)(see e.g. col. 3, line 61 thru col. 4, line 2; col. 6, line 41-59; col. 7, lines 58-68). The CCD receiver is connected to a computer such that adjustment of the illumination grid and/or the object of examination can be made (refers to instant claimed step of "*optionally adjusting said illumination pattern*", and instant claim 21)(see e.g. col. 4, lines 7-23; claims 17 and 18). The device is use to detect the image pattern of the object (refers to instant claimed step (c))(see e.g. col. 2, lines 55-68).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the

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detector as taught by Derndinger et al. in the method and apparatus of Pirrung et al. One of ordinary skill in the art would have been motivated to include an illumination matrix comprising a diode array in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein each individual light source can be controlled (Derndinger: col. 3, lines 62-68) since Pirrung et al. disclose any type of device with a means for controlling the location of light exposure can be use (Pirrung: col. 14, lines 41-59). Moreover, one of ordinary skill in the art would have been motivated to include a detector that comprises a light sensor array and the step of detecting the illumination pattern using the detector in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein the illumination grid can be adjusted (Derndinger: col. 4, lines 7-23) since Pirrung et al. disclose that any type of alignment technique can be use to accurately overlay successive masks (Pirrung: col. 13, lines 63-67). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Pirrung et al. and Derndinger et al. because the type of device use to produce and control the illumination pattern on the surface of the substrate would be a choice of experimental design and is considered within the purview of the cited prior art.

Therefore, the combine teachings of Pirrung et al. and Derndinger et al. do render the invention of the instant claims *prima facie* obvious.

20. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) in view of Derndinger et al. (US Patent 5,239,178) as applied to claims 1-4, 7-11, 13-17, 21-23, 46-49, 51, and 52 above, and further in view of Cerrina et al. (US Patent 6,375,903 B1).

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*The instant claimed invention recites a method for coating a biochip carrier with biologically or chemically functional materials.*

*The method comprises the steps of (a) providing a carrier, and illumination matrix, and a detector; (b) activating said photoactivatable groups on at least a predetermined area of said carrier surface by location- specific illumination of said predetermined area of said carrier surface using said illumination matrix to generate an adjustable illumination pattern; (c) detecting said illumination pattern using said detector and optionally adjusting said illumination pattern; (d) binding said biologically or chemically functional materials or building blocks for said materials on said predetermined areas of said carrier surface; and (e) repeating the activating, detecting, and binding steps on the same or different predetermined areas of said carrier surface.*

*The detector comprises a light sensor matrix.*

*The carrier having a surface comprises photoactivatable groups located on predetermined areas of said carrier surface.*

*In step (c) of the presently claimed method, the limitation is base on the instant claimed term "optionally", the broadest definition of the term "optionally" is applied, i.e. it is a choice. Thus, this method step is broadly interpreted as **either** being included in the method **or** not, i.e. it can be interpreted that the step of optionally adjusting said illumination pattern is omitted from the presently claimed method.*

Pirrung et al. disclose methods and apparatus for the preparation and use of a substrate having a plurality of polymer sequences in predefined regions (see e.g. Abstract; col. 3, lines 6-38; col. 8, lines 17-19).

The substrate (refers to instant claimed carrier) comprises an etched surface (refers to instant claimed predetermined area) and linker molecules on the surface of the substrate wherein the linker molecules are provided with a photoremovable protective group (refers to instant claimed photoactivatable groups)(see e.g. col. 3, lines 8-11; col. 8, lines 1-7 and 60-65; col. 11, lines 42-50; col. 12, lines 43-57). The substrate materials include materials such as glass, silicon, and polymers (refers to instant claims 8, 9, 47, and 48)(see e.g. col. 11, lines 29-41). The apparatus for the preparation of the substrate (refers to instant claimed illumination matrix)

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comprises a light source and a mask (see e.g. col. 3, lines 34-38; col. 13, lines 36-67; col. 14, lines 5-59).

The method comprises the steps of removing the photoremovable protective group on the linker molecules that are attached to the surface of the substrate by exposing the photoremovable protective group to light using a mask to direct light from the light source to selected regions on the substrate (refers to instant claimed steps (a) and (b), and instant claim 17), attaching the monomer to the surface of the substrate by reacting the monomer with the exposed functional group on the surface of the substrate (refers to instant claimed step (d)), and the steps (i.e. the removing and attaching steps) are repeated to selectively apply monomers until polymers of a desired length and chemical sequence are obtained (refers to instant claimed step (e) and instant claims 15, 22, and 23)(see e.g. col. 3, lines 8-38; col. 8, lines 17-33 and 46-65; col. 9, line 14 thru col. 10, line 30; col. 14, line 60 thru col. 15, line 48; figs. 1-7). The removing step generates a pattern of light and dark areas by selectively irradiating at least a first area of a surface of the substrate (refers to instant claims 4 and 11)(see e.g. figs. 15 A; claims 1). The area ranges from  $1\ \mu\text{m}^2$  to  $10,000\ \mu\text{m}^2$  (refers to instant claims 10 and 49)(see e.g. col. 15, lines 56-63; claim 6). The method produces an array of different polymers (refers to instant claim 16)(see e.g. col. 15, line 64 thru col. 16, line 8) and the polymers include nucleic acids, polysaccharides, or peptides (refers to instant claimed biological or chemically functional materials, and claims 13, 14, 51, and 52). The radiation used includes ultraviolet (UV), infrared (IR), or visible light (refers to instant claims 2 and 3)(col. 8, lines 66-67; col. 13, line 29 thru col. 14, line 59).

Derndinger et al. disclose a device for three-dimensional examination of object (see e.g. Abstract; col. 1, line 53 thru col. 2, line 2). The device comprises an illumination grid, a detector

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grid, and optical elements to image the illumination grid in a focal plane and to image the focal plane on the detector grid (see e.g. col. 1, line 56-62; col. 2, lines 3-23; col. 5, line 41 thru col. 6, line 59; claims 1 and 22). The detector grid includes a plurality of independent detector elements and is a CCD (Charge Coupled Device) receiver (refers to instant claimed light sensor matrix and instant claim 46)(see e.g. col. 3, lines 20-49; col. 5, line 41-53; col. 6, line 9-19; claims 3, 17, and 23). The illumination grid is produced by a light source array such as individual LEDs (light emitting diode) or liquid crystal display (refers to instant claim 7)(see e.g. col. 3, line 61 thru col. 4, line 2; col. 6, line 41-59; col. 7, lines 58-68). The CCD receiver is connected to a computer such that adjustment of the illumination grid and/or the object of examination can be made (refers to instant claimed step of “*optionally adjusting said illumination pattern*”, and instant claim 21)(see e.g. col. 4, lines 7-23; claims 17 and 18). The device is use to detect the image pattern of the object (refers to instant claimed step (c))(see e.g. col. 2, lines 55-68).

The combine teachings of Pirrung et al. and Derndinger et al. would be obvious over the invention of the instant claims because it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the detector as taught by Derndinger et al. in the method and apparatus of Pirrung et al. as fully discussed in the above rejection (see paragraph 19). The combine teachings of Pirrung et al. and Derndinger et al. differ from the presently claimed invention by failing to include an illumination matrix that is a reflection matrix having controllably deformable mirror.

Cerrina et al. disclose a method and apparatus for synthesis of arrays of probes sequences on the surface of a substrate (see e.g. Abstract; col. 2, lines 48-64). The method comprises the



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steps of projecting an array image onto the substrate surface, illuminating those pixels in the array on the substrate surface to be activated for binding to bases such that the applied light deprotected the OH groups on the substrate surface and makes them available for binding to bases, and binding the selected bases to the exposed sites, and repeating the steps until all elements of the array on the substrate surface have appropriate bound bases (see e.g. col. 2, lines 48-64; col. 9, line 56 thru col. 10, line 14; figs. 9-13). The apparatus for projecting an array image onto the substrate surface comprises a light source that provides light to a micromirror device comprising a two-dimensional array of electronically addressable micromirrors (refers to instant claims 5 and 6)(see e.g. col. 3, lines 11-16; col. 5, lines 41-61).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include an illumination matrix that is a reflection matrix having controllably deformable mirror as taught by Cerrina et al. in the method and device of Pirrung et al. and Derndinger et al. One of ordinary skill in the art would have been motivated to include an illumination matrix that is a reflection matrix having controllably deformable mirror in the method and device of Pirrung et al. and Derndinger et al. for the advantage of providing a device that does not requires lithographic masks and thus eliminating the significant costs and time delays associated with the production of lithographic masks and avoiding time-consuming manipulation and alignment of multiple masks during the fabrication process of the probe arrays (Cerrina: col. 2, lines 43-47) since Pirrung et al. disclose any type of device with a means for controlling the location of light exposure can be use (Pirrung: col. 14, lines 41-59). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Pirrung et al., Derndinger et al., and Cerrina et al. because the type of device use to produce

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and control the illumination pattern on the surface of the substrate would be a choice of experimental design and is considered within the purview of the cited prior art.

Therefore, the combine teachings of Pirrung et al., Derndinger et al., and Cerrina et al. do render the invention of the instant claims *prima facie* obvious.

21. Claims 27-41, 44, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) in view of Derndinger et al. (US Patent 5,239,178).

*The instant claimed invention recites a method for coating a biochip carrier with biologically or chemically functional materials.*

*The method comprises the steps of (a) providing a carrier and a UV light source array; (b) activating said photoactivatable groups on at least a predetermined area of said carrier surface by location- specific illumination of said predetermined area of said carrier surface using said UV light source array to generate an adjustable exposure pattern; (c) binding said biologically or chemically functional materials or building blocks for said materials on said predetermined areas of said carrier surface; and (d) repeating the activating and binding steps on the same or different predetermined areas of said carrier surface.*

*The carrier having a surface comprises photoactivatable groups located on predetermined areas of said carrier surface.*

Pirrung et al. disclose methods and apparatus for the preparation and use of a substrate having a plurality of polymer sequences in predefined regions (see e.g. Abstract; col. 3, lines 6-38; col. 8, lines 17-19).

The substrate (refers to instant claimed carrier) comprises an etched surface (refers to instant claimed predetermined area) and linker molecules on the surface of the substrate wherein the linker molecules are provided with a photoremovable protective group (refers to instant claimed photoactivatable groups)(see e.g. col. 3, lines 8-11; col. 8, lines 1-7 and 60-65; col. 11, lines 42-50; col. 12, lines 43-57). The substrate materials include materials such as glass, silicon, and polymers (refers to instant claims 32 and 33)(see e.g. col. 11, lines 29-41). The apparatus for

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the preparation of the substrate comprises a light source and a mask (see e.g. col. 3, lines 34-38; col. 13, lines 36-67; col. 14, lines 5-59).

The method comprises the steps of removing the photoremovable protective group on the linker molecules that are attached to the surface of the substrate by exposing the photoremovable protective group to light using a mask to direct light from the light source to selected regions on the substrate (refers to instant claimed steps (a) and (b), and instant claim 41), attaching the monomer to the surface of the substrate by reacting the monomer with the exposed functional group on the surface of the substrate (refers to instant claimed step (d)), and the steps (i.e. the removing and attaching steps) are repeated to selectively apply monomers until polymers of a desired length and chemical sequence are obtained (refers to instant claimed step (e) and instant claims 39, 44, and 45)(see e.g. col. 3, lines 8-38; col. 8, lines 17-33 and 46-65; col. 9, line 14 thru col. 10, line 30; col. 14, line 60 thru col. 15, line 48; figs. 1-7). The removing step generates a pattern of light and dark areas by selectively irradiating at least a first area of a surface of the substrate (refers to instant claims 31 and 36)(see e.g. figs. 15 A; claims 1). The area ranges from  $1\text{ }\mu\text{m}^2$  to  $10,000\text{ }\mu\text{m}^2$  (refers to instant claims 34 and 35)(see e.g. col. 15, lines 56-63; claim 6). The method produces an array of different polymers (refers to instant claim 40)(see e.g. col. 15, line 64 thru col. 16, line 8) and the polymers include nucleic acids, polysaccharides, or peptides (refers to instant claimed biological or chemically functional materials, and claims 37 and 38). The radiation used includes ultraviolet (UV), infrared (IR), or visible light (refers to instant claim 30)(col. 8, lines 66-67; col. 13, line 29 thru col. 14, line 59).

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The method and apparatus of Pirrung et al. differs from the presently claimed invention by failing to include a UV light source array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the detector.

Derndinger et al. disclose a device for three-dimensional examination of object (see e.g. Abstract; col. 1, line 53 thru col. 2, line 2). The device comprises an illumination grid, a detector grid, and optical elements to image the illumination grid in a focal plane and to image the focal plane on the detector grid (see e.g. col. 1, line 56-62; col. 2, lines 3-23; col. 5, line 41 thru col. 6, line 59; claims 1 and 22). The detector grid includes a plurality of independent detector elements and is a CCD (Charge Coupled Device) receiver (refers to instant claimed light sensor matrix and instant claim 29)(see e.g. col. 3, lines 20-49; col. 5, line 41-53; col. 6, line 9-19; claims 3, 17, and 23). The illumination grid is produced by a light source array such as individual LEDs (light emitting diode) or liquid crystal display (refers to instant claim 7)(see e.g. col. 3, line 61 thru col. 4, line 2; col. 6, line 41-59; col. 7, lines 58-68). The CCD receiver is connected to a computer such that adjustment of the illumination grid and/or the object of examination can be made (refers to instant claim 28)(see e.g. col. 4, lines 7-23; claims 17 and 18). The device is use to detect the image pattern of the object (refers to instant claimed step (c))(see e.g. col. 2, lines 55-68).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include an illumination matrix comprising a diode array, a detector comprising a light sensor array, and the step of detecting the illumination pattern using the detector as taught by Derndinger et al. in the method and apparatus of Pirrung et al. One of ordinary skill in the art would have been motivated to include an illumination matrix comprising

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a diode array in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein each individual light source can be controlled (Derndinger: col. 3, lines 62-68) since Pirrung et al. disclose any type of device with a means for controlling the location of light exposure can be use (Pirrung: col. 14, lines 41-59). Moreover, one of ordinary skill in the art would have been motivated to include a detector that comprises a light sensor array and the step of detecting the illumination pattern using the detector in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein the illumination grid can be adjusted (Derndinger: col. 4, lines 7-23) since Pirrung et al. disclose that any type of alignment technique can be use to accurately overlay successive masks (Pirrung: col. 13, lines 63-67). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Pirrung et al. and Derndinger et al. because the type of device use to produce and control the illumination pattern on the surface of the substrate would be a choice of experimental design and is considered within the purview of the cited prior art.

Therefore, the combine teachings of Pirrung et al. and Derndinger et al. do render the invention of the instant claims *prima facie* obvious.

22. Claims 56 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirrung et al. (US Patent 5,143,854) in view of Derndinger et al. (US Patent 5,239,178).

*The instant claimed invention recites a method for coating a biochip carrier with biologically or chemically functional materials.*

*The method comprises the steps of (a) providing a carrier and a UV light source array; (b) activating said photoactivatable groups on at least a predetermined area of said carrier surface by location- specific illumination of said predetermined area of said carrier surface using said UV light source array to generate an adjustable exposure pattern; (c) detecting said illumination pattern using said detector and optionally adjusting said illumination pattern; (d) binding said biologically or*

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*chemically functional materials or building blocks for said materials on said predetermined areas of said carrier surface; and (e) repeating the activating, detecting, and binding steps on the same or different predetermined areas of said carrier surface.*

*The carrier having a surface comprises photoactivatable groups located on predetermined areas of said carrier surface.*

*The UV light source array is selected from the group consisting of a diode array, a UV laser array, and both a diode array and a UV laser array.*

*In step (c) of the presently claimed method, the limitation is base on the instant claimed term "optionally", the broadest definition of the term "optionally" is applied, i.e. it is a choice. Thus, this method step is broadly interpreted as **either** being included in the method **or** not, i.e. it can be interpreted that the step of optionally adjusting said illumination pattern is omitted from the presently claimed method.*

Pirrung et al. disclose methods and apparatus for the preparation and use of a substrate having a plurality of polymer sequences in predefined regions (see e.g. Abstract; col. 3, lines 6-38; col. 8, lines 17-19).

The substrate (refers to instant claimed carrier) comprises an etched surface (refers to instant claimed predetermined area) and linker molecules on the surface of the substrate wherein the linker molecules are provided with a photoremovable protective group (refers to instant claimed photoactivatable groups)(see e.g. col. 3, lines 8-11; col. 8, lines 1-7 and 60-65; col. 11, lines 42-50; col. 12, lines 43-57). The substrate materials include materials such as glass, silicon, and polymers (see e.g. col. 11, lines 29-41). The apparatus for the preparation of the substrate comprises a light source and a mask (see e.g. col. 3, lines 34-38; col. 13, lines 36-67; col. 14, lines 5-59).

The method comprises the steps of removing the photoremovable protective group on the linker molecules that are attached to the surface of the substrate by exposing the photoremovable protective group to light using a mask to direct light from the light source to selected regions on the substrate (refers to instant claimed steps (a) and (b)), attaching the monomer to the surface of

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the substrate by reacting the monomer with the exposed functional group on the surface of the substrate (refers to instant claimed step (d)), and the steps (i.e. the removing and attaching steps) are repeated to selectively apply monomers until polymers of a desired length and chemical sequence are obtained (refers to instant claimed step (e))(see e.g. col. 3, lines 8-38; col. 8, lines 17-33 and 46-65; col. 9, line 14 thru col. 10, line 30; col. 14, line 60 thru col. 15, line 48; figs. 1-7). The removing step generates a pattern of light and dark areas by selectively irradiating at least a first area of a surface of the substrate (see e.g. figs. 15 A; claims 1). The area ranges from  $1\text{ }\mu\text{m}^2$  to  $10,000\text{ }\mu\text{m}^2$  (see e.g. col. 15, lines 56-63; claim 6). The method produces an array of different polymers (see e.g. col. 15, line 64 thru col. 16, line 8) and the polymers include nucleic acids, polysaccharides, or peptides (refers to instant claimed biological or chemically functional materials). The radiation used includes ultraviolet (UV), infrared (IR), or visible light (col. 8, lines 66-67; col. 13, line 29 thru col. 14, line 59).

The method and apparatus of Pirrung et al. differs from the presently claimed invention by failing to include a UV light source array comprising a diode array, and the step of detecting the illumination pattern using the detector.

Derndinger et al. disclose a device for three-dimensional examination of object (see e.g. Abstract; col. 1, line 53 thru col. 2, line 2). The device comprises an illumination grid, a detector grid, and optical elements to image the illumination grid in a focal plane and to image the focal plane on the detector grid (see e.g. col. 1, line 56-62; col. 2, lines 3-23; col. 5, line 41 thru col. 6, line 59; claims 1 and 22). The detector grid includes a plurality of independent detector elements and is a CCD (Charge Coupled Device) receiver (see e.g. col. 3, lines 20-49; col. 5, line 41-53; col. 6, line 9-19; claims 3, 17, and 23). The illumination grid is produced by a light source array

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such as individual LEDs (light emitting diode) or liquid crystal display (refers to instant claimed UV light source array comprising a diode array)(see e.g. col. 3, line 61 thru col. 4, line 2; col. 6, line 41-59; col. 7, lines 58-68). The CCD receiver is connected to a computer such that adjustment of the illumination grid and/or the object of examination can be made (refers to instant claimed step of "*optionally adjusting said illumination pattern*")(see e.g. col. 4, lines 7-23; claims 17 and 18). The device is use to detect the image pattern of the object (refers to instant claimed step (c))(see e.g. col. 2, lines 55-68).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a UV light source array comprising a diode array, and the step of detecting the illumination pattern using the detector as taught by Derndinger et al. in the method and apparatus of Pirrung et al. One of ordinary skill in the art would have been motivated to include a UV light source array comprising a diode array in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein each individual light source can be controlled (Derndinger: col. 3, lines 62-68) since Pirrung et al. disclose any type of device with a means for controlling the location of light exposure can be use (Pirrung: col. 14, lines 41-59). Moreover, one of ordinary skill in the art would have been motivated to include the step of detecting the illumination pattern using the detector in the method and apparatus of Pirrung et al. for the advantage of providing a device wherein the illumination grid can be adjusted (Derndinger: col. 4, lines 7-23) since Pirrung et al. disclose that any type of alignment technique can be use to accurately overlay successive masks (Pirrung: col. 13, lines 63-67). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Pirrung et al. and Derndinger et al. because the type of device use to produce and control the



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illumination pattern on the surface of the substrate would be a choice of experimental design and is considered within the purview of the cited prior art.

Therefore, the combine teachings of Pirrung et al. and Derndinger et al. do render the invention of the instant claims *prima facie* obvious.

### ***Double Patenting***

23. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

24. Claims 1, 8, 14, and 16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 6, and 35 of copending Application No. 09/763,914. Although the conflicting claims are not identical, they are not patentably distinct from each other because the method of copending Application No. 09/763,914 anticipates the method of the instant claim 1.

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Claim 1 of copending Application No. 09/763,914 recite the method steps of (a) providing a support, wherein said support comprises a support body comprising at least one channel which comprises a conduit with a top, a bottom and two sides having an inlet and an outlet for passing fluid from the inlet to the outlet, and at least one reaction position in the support body, wherein said support is optically transparent at least in the region of said at least one reaction position, (b) placing said support body between a programmable light source matrix and a detector matrix, (c) passing liquid with building blocks for synthesizing said polymeric receptors through the channel or channels of the support body, (d) site- and/or time-specifically immobilizing said building blocks on predetermined reaction positions in the channel or channels by illumination of said predetermined reaction positions by said programmable light source matrix, wherein the illumination position of said light source matrix is monitored by computer using said detector matrix, and (e) repeating steps (c) and (d) until said polymeric receptors have been synthesized on the predetermined positions. Steps (a) and (b) would read on step (a) of claim 1 in the instant application. Steps (c) and (d) would read on step (b)-(d) of claim 1 in the instant application. And step (e) would read on step (e) of claim 1 in the instant application. As a result, the method of the instant application is generic to the presently claimed of copending Application No. 09/763,914, or in other words, the instant claim 1 is anticipated by claim 1 of copending Application No. 09/763,914.

In addition, the support of copending Application No. 09/763,914 reads on the instant claimed carrier and claim 8. The polymeric receptors of copending Application No. 09/763,914 read on the instant claimed biological or chemical functional materials and claims 5 and 6 of

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compending Application No. 09/763,914 read on the instant claim 14. Claim 35 of compending Application No. 09/763,914 read on the instant claim 16.

Consequently, the examined claims would have been obvious over the claims of compending Application No. 09/763,914.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### ***Allowable Subject Matter***

25. Claims 18, 42, 43, and 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

26. Applicant's arguments with respect to claims 1-11, 13-18, 21-23, 27-52, and 56-57 have been considered but are moot in view of the new ground(s) of rejection.

27. In response to applicant request to held the provisional double patent for compending Application No. 09/763,914 in abeyance (see response pg. 16, last paragraph), the provisional rejection for compending Application No. 09/763,914 will not be held in abeyance (e.g., see MPEP § 804 B. Between Compending Applications-Provisional Rejections, "The 'provisional' double patenting rejection should continue to be made by the examiner in each application as long as there are conflicting claims in more than one application unless that "provisional" double

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patenting rejection is the only rejection remaining in one of the applications.”). Here, a double patenting rejection is **NOT** the only rejection remaining in one of the applications and thus the double patenting rejection is proper. Thus, the provisional double patent rejection for copending Application No. 09/763,914 is maintained. Furthermore, the provisional double patent rejection for copending Application No. 09/763,914 has been modified from its original version to more clearly address applicant's newly amended claim 1.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to My-Chau T. Tran whose telephone number is 571-272-0810. The examiner can normally be reached on Monday: 8:00-2:30; Tuesday-Thursday: 7:30-5:00; Friday: 8:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Paras, Jr., can be reached on 571-272-4517. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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patenting rejection is the only rejection remaining in one of the applications.”). Here, a double patenting rejection is **NOT** the only rejection remaining in one of the applications and thus the double patenting rejection is proper. Thus, the provisional double patent rejection for copending Application No. 09/763,914 is maintained. Furthermore, the provisional double patent rejection for copending Application No. 09/763,914 has been modified from its original version to more clearly address applicant's newly amended claim 1.

### ***Conclusion***

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My-Chau T. Tran  
June 7, 2006

